Stoller
Hanford Office

DOE-EM/GJ618-2004

C4232
Log Data Report

Borehole Information:

Borehole: C4232			**Site:** 216-U-12 Crib		
Coordinates (WA State Plane)		**GWL (ft)[1]:** Dry		**GWL Date:**	03/17/2004
North	**East**	**Drill Date**	**TOC[2] Elevation**	**Total Depth (ft)**	**Type**
Not Available	Not Available	03/15/04	Not Applicable	50	Push Hole

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded steel	0.4	6 5/8	5 1/2	9/16	1.0	50.0

Borehole Notes:

The logging engineer measured a sample of casing located in a lay-down area next to the borehole. Outside casing diameter was measured using a caliper. The caliper and inside casing diameter were measured using a steel tape, and measurements were rounded to the nearest 1/16 in.

Logging Equipment Information:

Logging System:	Gamma 1G		**Type:** SGLS (35%) 34TP10967A
Calibration Date:	01/2004	**Calibration Reference:**	GJO-2004-597-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3- Repeat		
Date	03/18/04	03/18/04	03/18/04		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	49.21	49.0	40.0		
Finish Depth (ft)	49.21	0.0	35.0		
Count Time (sec)	200	200	200		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A[3]	N/A	N/A		
Pre-Verification	AG053CAB	AG053CAB	AG053CAB		
Start File	AGO53000	AGO53001	AGO53051		
Finish File	AG053000	AG053050	AG053056		
Post-Verification	AG054CAA	AG054CAA	AG054CAA		
Depth Return	N/A	0	0		

Log Run	1	2	3- Repeat		
Error (in.)					
Comments	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.		

Logging Operation Notes:

Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier with serial number 118. Logging started at the nearest 0.5-ft interval after reaching total depth. The maximum logging depth is 49.21 ft. Zero reference is the ground surface.

Analysis Notes:

Analyst:	Henwood	Date:	03/22/04	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected at the beginning and end of the day. All of the verification spectra were within the acceptance criteria. Examinations of spectra indicate that the detector functioned normally during logging, and the spectra are accepted.

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G1GJan04.xls). Zero reference was the ground surface. Based on the field measurements, the casing configuration was assumed as one string of 6-in. casing with a thickness of 9/16 in. to 49.21 ft (total logging depth). No dead time or water corrections were required.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs and processed uranium (^{238}U and ^{235}U) were the man-made radionuclides detected in this borehole. ^{137}Cs was detected at the ground surface and 17 ft near its MDL of 0.1 pCi/g.

^{238}U as inferred from the ^{234m}Pa 1001-keV energy peak was detected between 26 and 40 ft. The maximum concentration was 77 pCi/g at 38 ft. ^{235}U was detected between 34 and 40 ft with a maximum concentration of 4 pCi/g at 39 ft.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the natural radionuclides at energy levels of 1461, 1764, and 2614 keV and the man-made radionuclides at 662, 186, and 1001 keV.

[1] GWL – groundwater level
[2] TOC – top of casing
[3] N/A – not applicable

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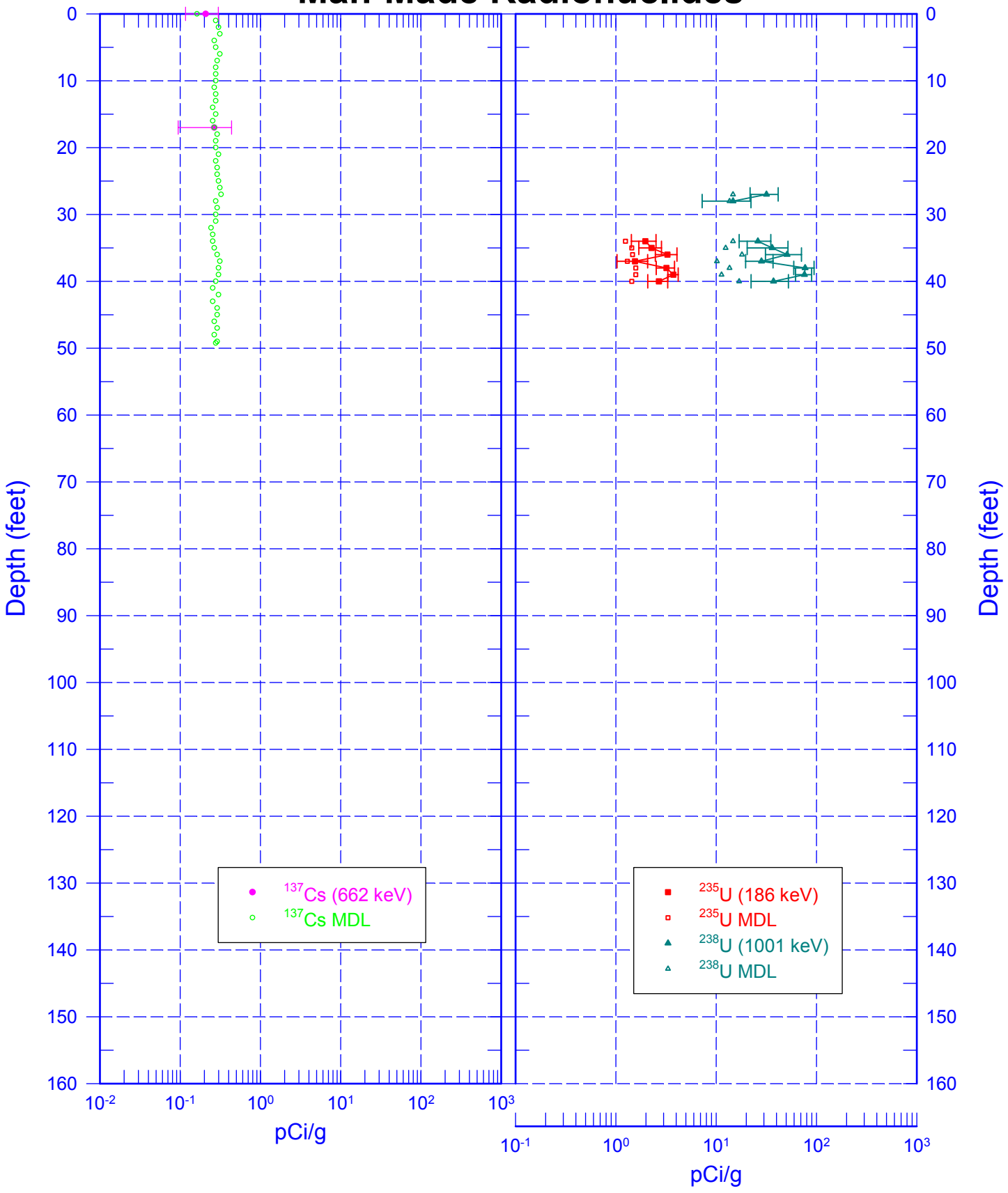
Man-Made Radionuclides



Zero Reference = Ground Surface

Depth Scale: 1"=20 ft

Last Log Date - 03/18/04

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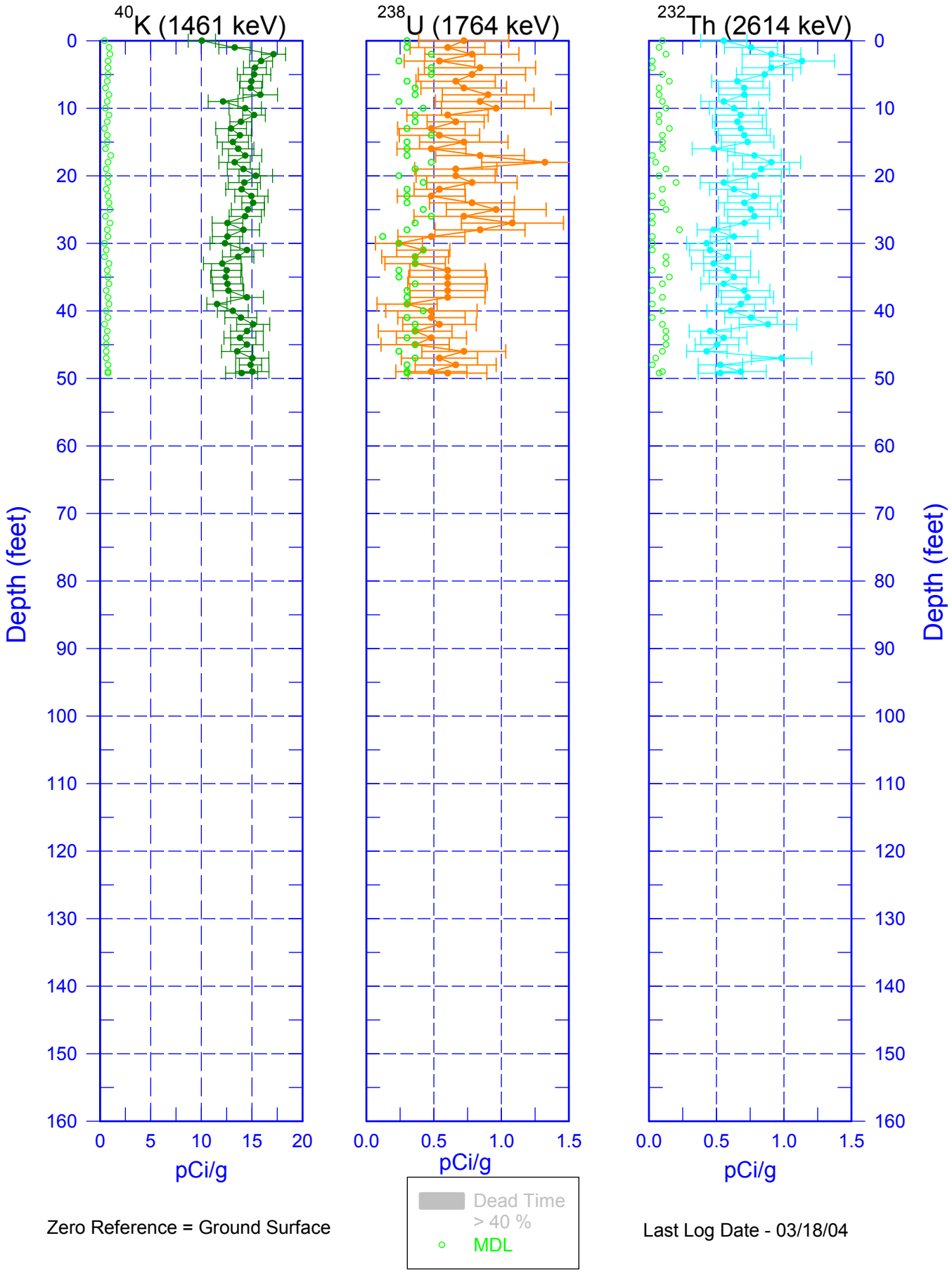
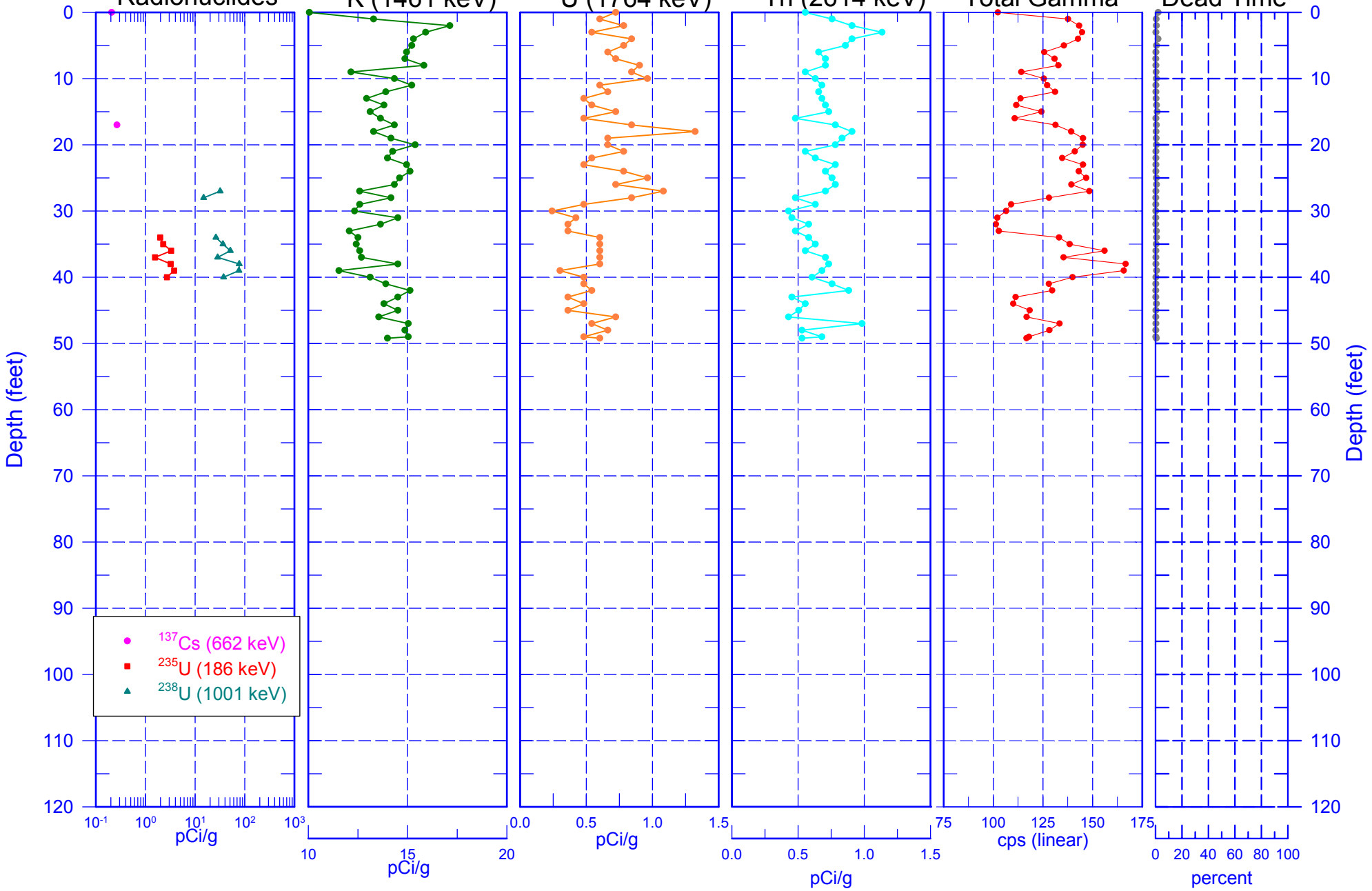
Natural Gamma Logs



Zero Reference = Ground Surface

Last Log Date - 03/18/04

C4232 Combination Plot

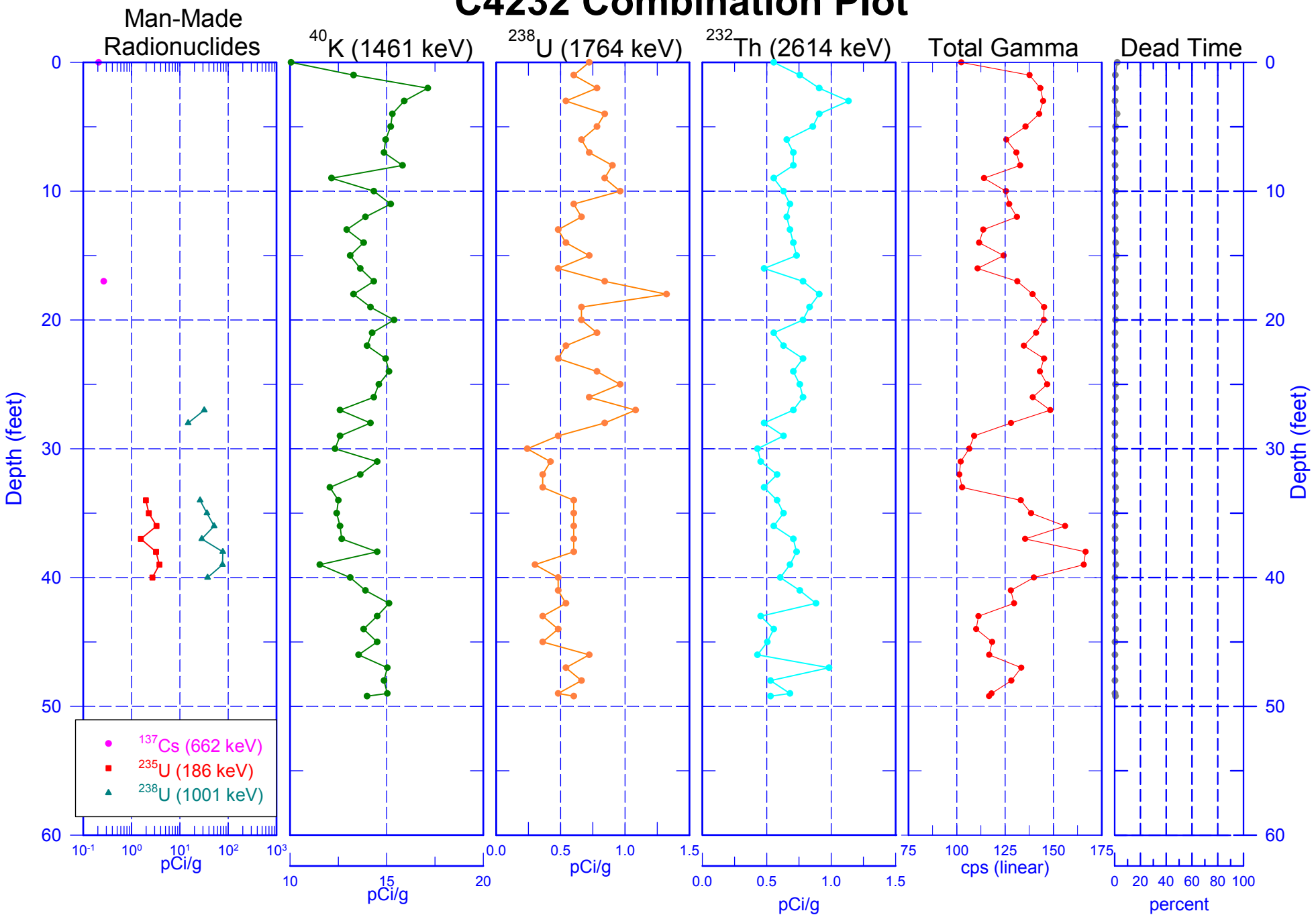


Zero Reference = Ground Surface

Depth scale: 1"=20 ft

Last Logging Date - 03/18/04

C4232 Combination Plot



Zero Reference = Ground Surface

Depth scale: 1" = 10 ft

Last Logging Date - 03/18/04

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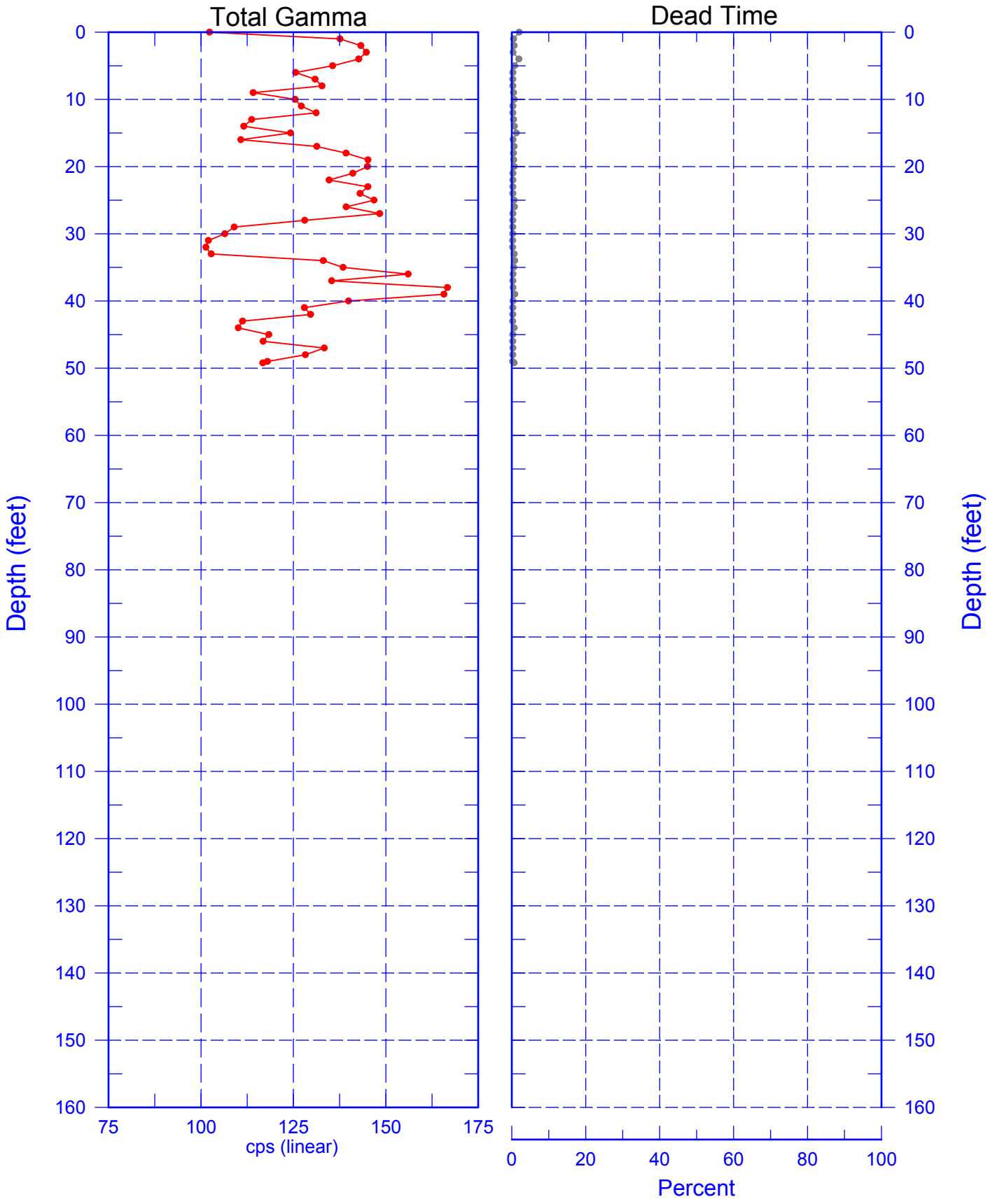
Total Gamma & Dead Time



Depth scale:1"=20 ft

Reference - Ground Surface

Last Log Date - 03/18/04

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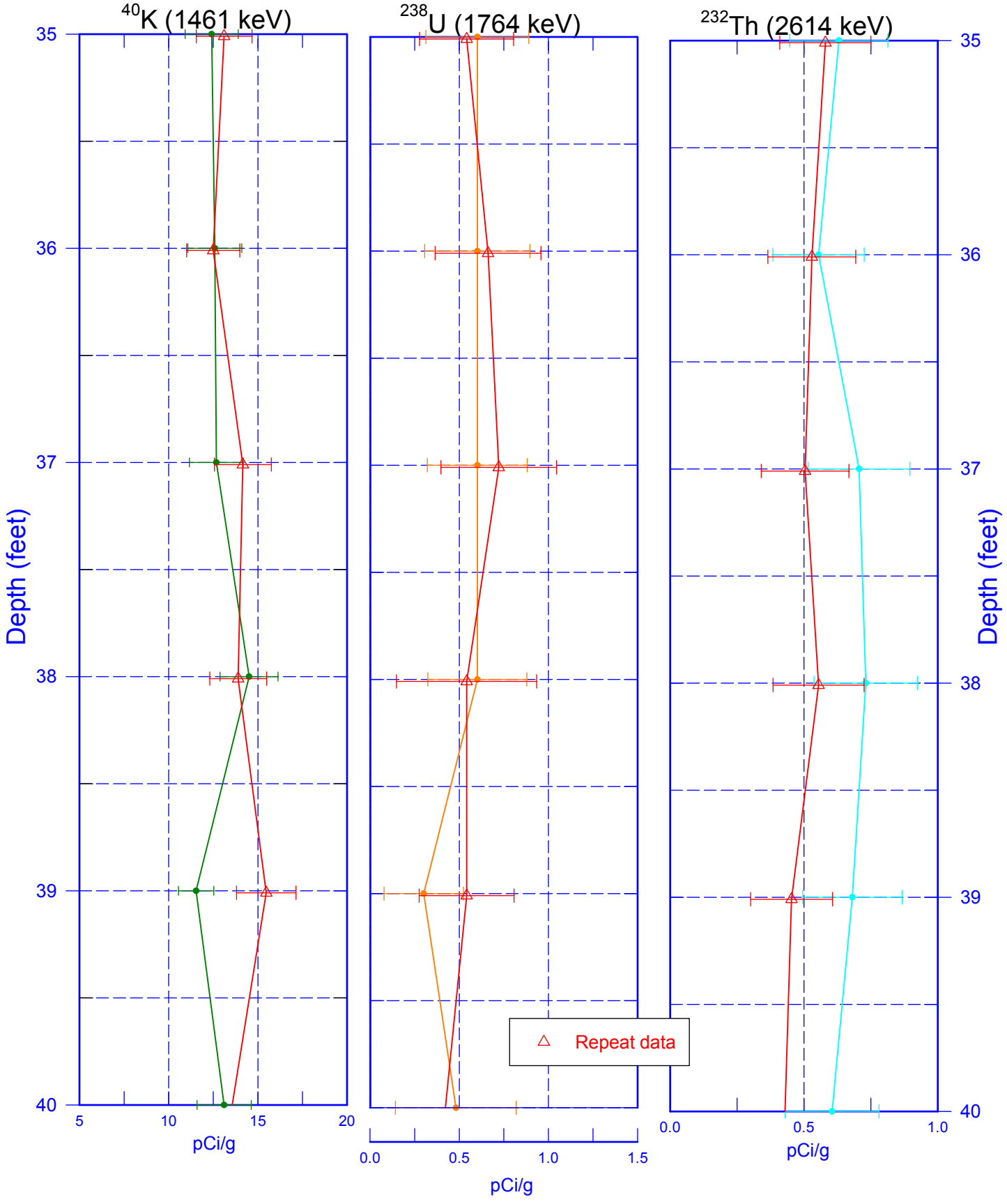
Repeat Section of Natural Gamma Logs



Zero Reference = Ground Surface

Last Log Date - 03/18/04

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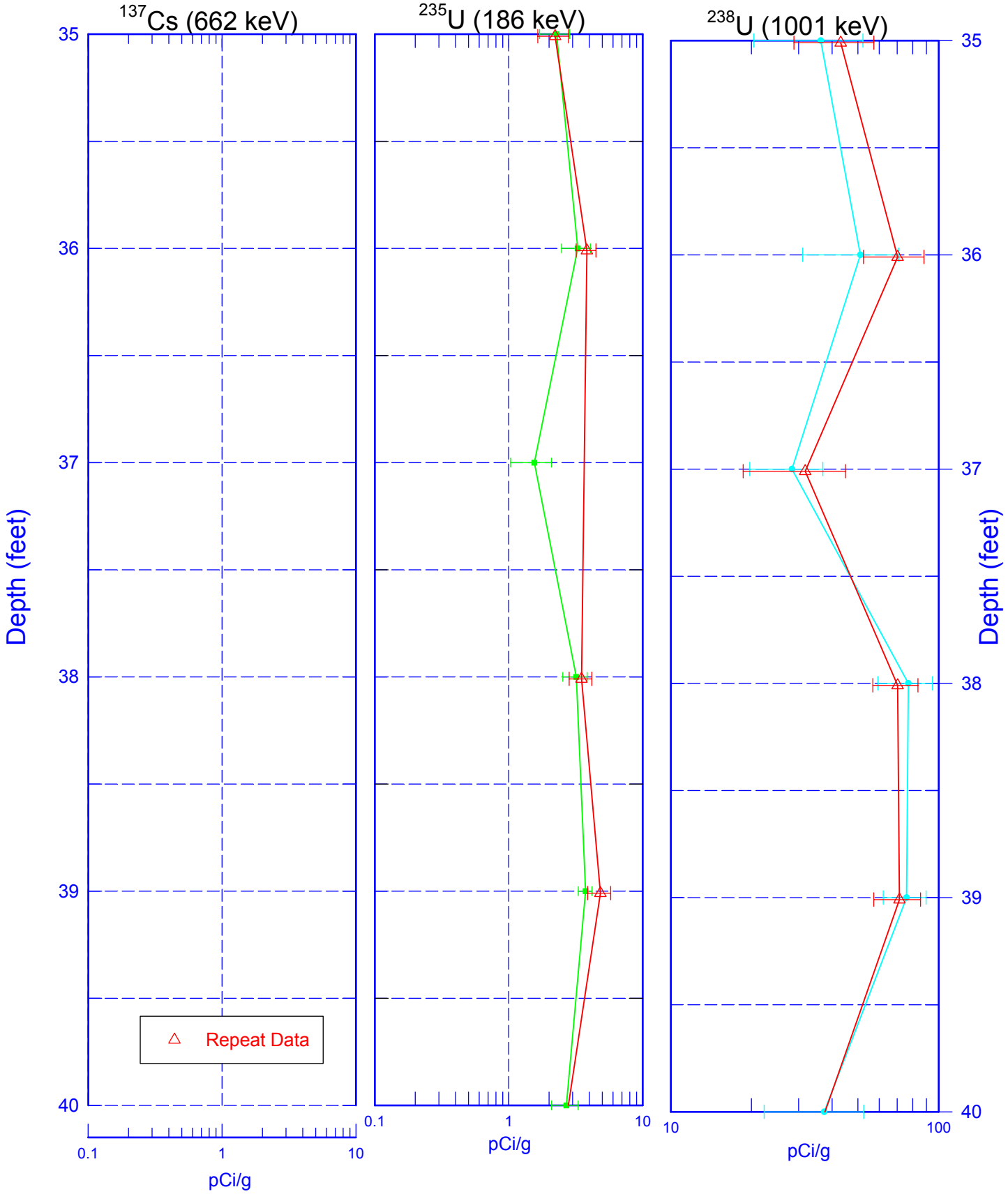
Repeat Section of Man-Made Radionuclides



Zero Reference = Ground Surface

Last Log Date - 03/18/04